

Release Notes

HP StorageWorks

HSG80 Enterprise Modular Storage RAID

Array Fibre Channel Solution Software

V8.8

for Sun Solaris

Product Version: 8.8-1

First Edition (March 2005)

Part Number: AA-RV1SA-TE

This document contains last-minute and supplemental information about your Solution Software. In the event of conflicting information between these Release Notes and other documents contained in this product release, the Release Notes content takes precedence. For the latest version of these Release Notes and other product documentation, visit the HP web site at <http://h18006.www1.hp.com/products/storageworks/acs/documentation.html>.



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HSG80 Enterprise Modular Storage RAID Array Fibre Channel Solution Software V8.8 for Sun
Solaris Release Notes
First Edition (March 2005)
Part Number: AA-RV1SA-TE

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Intended Audience

This document is intended for storage administrators and HP authorized service personnel who install and maintain HP StorageWorks Enterprise or Modular Storage RAID Array products that include HP StorageWorks HSG80 RAID Array Controllers.

Conventions

The following conventions are used throughout this document:

- Unless otherwise specified, all references to controllers or array controllers imply the HP StorageWorks HSG80 RAID Array Controller.
- Unless otherwise specified, all references to HP StorageWorks Array Controller Software V8.8-1 imply the released HP StorageWorks ACS V8.8-1 code or subsequently patched versions of ACS V8.8-1.
- For the purpose of this document, Enterprise and Modular Storage RAID Array refers to the following HP StorageWorks RAID Array products:
 - Fibre Channel RAID Array 8000 (RA8000)
 - Enterprise Storage Array 12000 Fibre Channel (ESA12000)
 - Modular Array 8000 Fibre Channel (MA8000)
 - Enterprise Modular Array 12000 Fibre Channel (EMA12000)
 - Enterprise Modular Array 16000 Fibre Channel (EMA16000)

Abbreviations and Acronyms

The following abbreviations and acronyms are used throughout this document:

- **ACS**—Array Controller Software
- **CCL**—Command Console LUN
- **CLI**—Command Line Interpreter
- **EISA**—Extended Industry Standard Architecture
- **EMU**—Environmental Monitoring Unit
- **EVA**—Enterprise Virtual Array
- **FC**—Fibre Channel
- **FC-AL**—Fibre Channel - Arbitrated Loop
- **FC-SW**—Fibre Channel - Switched
- **FRU**—Field-Replaceable Unit
- **HBA**—Host Bus Adapter
- **LUN**—Logical Unit Number
- **LVD**—Low Voltage Differential
- **NVRAM**—Non-Volatile Random Access Memory
- **PCMCIA**—Personal Computer Memory Card Industry Association
- **PVA**—Power Verification and Addressing module
- **RAID**—Redundant Array of Independent Disks
- **RETMA**—Radio Electronics Television and Manufacturing Association
- **SAN**—Storage Area Network
- **SBB**—Storage Building Block
- **SCSI**—Small Computer System Interface
- **SMART**—Self-Monitoring Analysis and Reporting Technology
- **SWCC**—HP StorageWorks Command Console
- **VCS**—Virtual Controller Software
- **WWID**—World Wide Identifier
- **WWN**—World Wide Name

Release Package Contents

The Array Controller ACS Kit includes:

- Program (PCMCIA) card
- Cover letter

Additional documentation, including white papers and best practices documents, are available through the HP web site at:

<http://h18006.www1.hp.com/products/storageworks/acs/index.html>.

This HSG80 Fibre Channel Solution Software Kit consists of the following:

- The HSG80 Solution Software documentation set which includes:
 - *HSG80 ACS Solution Software V8.8 for Sun Solaris Installation and Configuration Guide*
 - *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Command Line Interface Reference Guide, EK-G80CL-RA. C01*
 - *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Maintenance and Service Guide, EK-G80MS-SA.C01*
 - *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Troubleshooting Guide, EK-G80TS-SA. C01*
 - *HP StorageWorks Command Console Version 2.5 User Guide*
 - *HP StorageWorks Command Console Version 2.5 Release Notes*
 - *Registration and Warranty Package*
 - *HSG80 Enterprise and Modular Storage RAID Array Fibre Channel Solution Software V8.8 for Sun Solaris Release Notes (this document)*
- *HSG80 Modular Storage RAID Arrays Solution Software V8.8 for Sun Solaris (available from*
<http://h18006.www1.hp.com/products/storageworks/ma8kema12k/kits.html>)
 - Installation and scripting utilities
 - Device drivers

The following supporting documentation is available from the HP StorageWorks web site <http://h18006.www1.hp.com/products/storageworks/acs/documentation.html>.

- *SAN Design Reference Guide*

- *Enterprise and Modular Storage RAID Array Fibre Channel Arbitrated Loop Configurations Application Note*
- *Model 2100 and 2200 Ultra SCSI Controller Enclosures User Guide*
- *Model 4300 Family Ultra3 LVD Disk Enclosures User Guide*
- *Modular Array Cabinet Restrictions*

Upgrading ACS

To upgrade your ACS firmware to ACS V8.8-1, see the *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Maintenance and Service Guide*. After you upgrade to ACS V8.8-1, you must then complete specific after-upgrade maintenance checks.



Caution: If you are upgrading to ACS 8.8-1P (HP StorageWorks Data Replication Manager) with active Remote Copy Sets, note the following guidelines:

- Ensure that the latest drivers and that SecurePath V3.0A (Service Pack 1) or SecurePath V3.0B (Service Pack 1) are installed before upgrading.
 - Complete a shutdown upgrade if you are running Windows NT, Windows 2000, or IBM AIX. Rolling upgrades are not supported on these platforms. Failure to follow these guidelines can result in undesirable controller upgrade issues.
-



Caution: It is critical that you follow upgrade instructions as documented in the *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Maintenance and Service Guide* to prevent data loss or corruption. If at any time you encounter problems during the upgrade, contact your HP support representative.

Multiple Storage System Types

The extended interoperability of the heterogeneous SAN allows you to mix several types of HP StorageWorks storage systems. HP recommends the following configuration rules when different storage products are shared in the same SAN:

- HSG80 ACS V8.8-1 and EVA VCS V2.x or 3.x—Use ACS Solution Software V8.8-1 (includes SWCC V2.5) or EVA V3.0C (includes SSSU).
- HSG80 ACS V8.6 and EVA VCS V2.x—Use ACS Solution Software V8.6 (if SWCC V2.4 components are desired) and VCS V2.0 compatible multi-bus software/drivers.
- HSG80 ACS V8.6 and EVA VCS V2.x or 3.x—Use ACS Solution Software V8.8-1 (includes SWCC V2.5) or EVA V3.0C (includes SSSU).
- HSG80 ACS V8.7 and EVA VCS V2.x or 3.x—Use ACS Solution Software V8.8-1 (includes SWCC V2.5) or EVA V3.0C (includes SSSU).

Note: Any multiple storage system configuration that includes EVA VCS V2.x or 3.x requires multi-bus support. See “[Secure Path Software](#)” on page 35 for compatible Secure Path versions. ACS V8.8-1 compatible Secure Path versions and HBA drivers are compatible with VCS V2.x or 3.x.

New Features

This section briefly describes new features and changes of this release.

New Features for Solution Software V8.8-1

The following major enhancements are included in the 8.8-1 release of the Solution Software Kit.

- **SUN Solaris 2.6, 7, 8, and 9**—CPQ/JNI driver V2.6.13; QLogic driver V4.13.01.

ACS Enhancements and Fixes

This section covers:

- [New CLI Commands and Switches](#), page 11
- [Other Enhancements](#), page 19
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New CLI Commands and Switches

[Table 1](#) on page 11 lists and describes new Command Line Interface (CLI) commands and switches with this release of ACS V8.8-1.

Table 1: New CLI Commands and Switches

Item	CLI Command or Switch	Description and Background
1.	DEFAULT_ACCESS=ENABLE (default) DEFAULT_ACCESS=DISABLE	Directs the controller to automatically disable or enable connections after creating units through the CLI. This switch is used in conjunction with the SET <i>controller</i> command. Although the HP StorageWorks HSG Element Manager and HP StorageWorks Command Console disable all connections for units created through their respective programs, creating new units through the CLI requires you to manually disable connections.
2.	SHOW ELEVATION_INFO	Combines several existing commands to allow you to output and transfer relevant and helpful controller configuration information needed by HP service representatives before and during a support call.
3.	WWID_ASSIGN storageset LUN_WWID=xx	Assigns World Wide ID (WWID) addresses to storage containers.

Table 1: New CLI Commands and Switches (Continued)

Item	CLI Command or Switch	Description and Background
4.	HOST_REDUNDANT NOHOST_REDUNDANT	<p>Turns on and off the capability to redirect the host to the redundant unit copy for the original requested unit data after the controller is unable to submit data from the original unit to the host. This switch is used in conjunction with the SET <i>unit-number</i> command.</p> <p>In dual-redundant configurations, when a controller in earlier ACS versions was unable to retrieve data from a failed unit upon request from a host, some host systems (particularly Tru64 UNIX with Logical Storage Manager) continuously waited for data to be returned from the controller without automatically retrieving the same data from the dual-redundant unit copy. Simultaneously, the controller continuously attempted to retrieve the data from the failed unit without success.</p>

Table 1: New CLI Commands and Switches (Continued)

Item	CLI Command or Switch	Description and Background
5.	DESTROY_MBR	<p>Removes the 8 MB partition from a presented LUN and destroys the master boot record (MBR) present on new or replacement spares, HP-manufactured disk drives. This switch is used in conjunction with the INITIALIZE command.</p> <p>Previously, Microsoft Windows and Windows NT® host systems, under specific circumstances, adversely created two partitions (an 8 MB partition and then the second partition for the rest of the presented LUN space) after a new, HP-manufactured disk was added to a subsystem and exported to a Microsoft Windows host system.</p> <hr/> <p>Note: The pre-existing partition table, or a <i>master boot record (MBR)</i>, is a designated partition for SMART array controllers.</p> <hr/> <p>When the HSG container is presented by the MS OS to the applications, the MS OS assigns a drive to each partition.</p> <p>With ACS V8.8-1, when adding new disks to a Windows and Windows NT host systems, you can add disks and then initialize them with the INIT device DESTROY_MBR CLI command. At your discretion, partitions can be optionally created at the controller (controller partitioning) or be created at the OS through Disk Administrator as host partitions.</p>

Table 1: New CLI Commands and Switches (Continued)

Item	CLI Command or Switch	Description and Background
6.	FAKE_PR	<p>Note: Use the FAKE_PR switch for maintenance or recovery operations only.</p> <hr/> <p>If set on a unit, allows the controller to signal to host systems implementing persistent reservations that persistent reservations are lost. (Lost persistent reservations can occur as a result of mirrored cache reconfiguration or maintenance activities, such as cache module replacement.) After the FAKE_PR switch is invoked, the host resets persistent reservations against all units in the storage system after the host clears its internal persistent reservation reference database. After successful communication, the host can recreate persistent reservations that were lost.</p> <p>Host systems (such as Tru64 UNIX, V5.x) implementing persistent reservations assume that persistent reservations are never lost under any condition. Changing the mirrored cache setting causes persistent reservations to be lost by the controller because the controller reformats cache memory data structures where persistent reservation data for units reside.</p>

Table 1: New CLI Commands and Switches (Continued)


Item	CLI Command or Switch	Description and Background
7.	REINITIALIZE container-name	<p>Invokes maintenance actions against initialized containers and modifies container metadata. Also modifies the prior device initialization or acts upon storageset attributes before its initialization.</p> <hr/> <p>Note: Issue this command with a valid switch. See the following CLI command switches in this table:</p> <ul style="list-style-type: none"> ■ REINITIALIZE container-name TURNSAVEOFF on page 16 ■ REINITIALIZE container-name SPECIAL_FUNCTION_ONE=INFO on page 16 ■ REINITIALIZE container-name SPECIAL_FUNCTION_ONE=PARTITION on page 17 ■ REINITIALIZE container-name SPECIAL_FUNCTION_ONE=NOPARTITION on page 18 <hr/> <div>  <p>Caution: Before invoking this command, HP recommends that you record previous controller configuration information for backup purposes.</p> </div> <hr/>

Table 1: New CLI Commands and Switches (Continued)

Item	CLI Command or Switch	Description and Background
8.	REINITIALIZE container-name TURNSAVEOFF	Disables the option to save configuration information for devices that were initialized with the <code>SAVE_CONFIGURATION</code> switch.
9.	REINITIALIZE container-name SPECIAL_FUNCTION_ONE=INFO	<p>Directs the controller to examine RAID5-only containers and report:</p> <ul style="list-style-type: none"> ■ Which devices, if any, have metadata attributes that are inconsistent as a result of sparing operations to RAID5 sets while ACS V8.7-2 or later was running. ■ Which devices have partition flags, no partition flags, or inconsistencies on associated containers. ■ Whether attached units exist, if any. <hr/> <p>Note: Issuing this command displays information for only those containers or units that are online or assigned to the controller from which the command is issued. If you issue this switch with the <code>REINITIALIZE container-name</code> command for a RAIDset on another controller, the following message displays:</p> <p>Error 9620: Information not available on this controller. Enter command on other controller.</p> <hr/>

Table 1: New CLI Commands and Switches (Continued)



Item	CLI Command or Switch	Description and Background
10.	REINITIALIZE container-name SPECIAL_FUNCTION_ONE= PARTITION	<p>Directs the controller to set the partition flag bits on all devices in a container and establishes the container as a partitioned container. This command can only be used with RAIDset containers.</p> <hr/> <div>  <div> Caution: Ensure that the container was previously initialized as a partitioned container before using this command. Failure to do so results in loss of access to partitioned data. </div> </div> <hr/> <div> Note: Issuing the SPECIAL_FUNCTION_ONE=PARTITION or the SPECIAL_FUNCTION_ONE=PARTITION switch in dual-redundant controller configurations causes the container ownership to move to the controller from which the REINITIALIZE <i>container-name</i> command was <i>not</i> issued. </div> <hr/>

Table 1: New CLI Commands and Switches (Continued)

Item	CLI Command or Switch	Description and Background
11.	REINITIALIZE container-name SPECIAL_FUNCTION_ONE= NOPARTITION	<p>Directs the controller to reset the partition flag bits on devices in a container and establishes the container as a non-partitioned container. This command can only be used with RAIDset containers.</p> <hr/> <p> Caution: Ensure that the container was previously initiated as a non-partitioned container before using this command. Failure to do so results in loss of access to any partitioned data.</p> <hr/> <p>Note: Issuing the SPECIAL_FUNCTION_ONE=PARTITION or the SPECIAL_FUNCTION_ONE=NOPARTITION switch in dual-redundant controller configurations causes the container ownership to move to the controller from which the REINITIALIZE <i>container-name</i> command was <i>not</i> issued.</p> <hr/>
12.	SHOW RAIDSETS SPECIAL_FUNCTION_ONE	<p>Displays a listing of all RAIDset containers and either one of three possible container statuses: Good, Maintenance Recommended, or REPORTED ON THE OTHER CONTROLLER.</p> <hr/> <p>Note: Refer to Chapter 4 of the <i>HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Maintenance and Service Guide</i> for additional details related to this command.</p> <hr/>

Other Enhancements

Host Connection Maximum and New Instance Code, 43036A64

If you exceed the maximum number of host connections (96), ACS now notifies you of the discrepancy. A new instance code, 43036A64, is issued, and if you attempt to add new connections after the maximum number of connections is reached, they are rejected. No other connections can be added until the host connection table is cleared of *stale entries* (inactive connections still listed on the connection table) or some of the existing entries are deleted. See the *HP StorageWorks Array Controller and Array Controller Software Troubleshooting Guide* and the *HP StorageWorks Array Controller and Array Controller Software Command Line Interface Guide* for additional information.

Maximum host connections and new repair action code (6A)

A new repair action code (6A) prompts you to use specific steps to resolve the problem associated with exceeding the maximum number of host connections. Refer to the *HP StorageWorks Array Controller and Array Controller Software Troubleshooting Guide* for additional details.

New ASC and ASCQ code

The following table lists a new ASC and ASCQ code included in this release.

Table 2: New ASC and ACSQ code

ASC Code	ASCQ Code	Description
A0	0B	Connection table is full.

See the for *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Troubleshooting Guide* for additional information.

Deadman controller restarts

New data has been added to the controller failure information if a Deadman Timer expiration occurs. The following information is now appended to LFC 02DD0104:

```
Last Failure Parameter [2] Bit Mask of Resource Waiters
Last Failure Parameter [3] Contains the address of the waiter
routine.
```

The addition of this new data provides additional troubleshooting guidance. See the *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Troubleshooting Guide* for additional information.

SHOW CONNECTIONS *FULL* command and additional screen display information

After entering the `SHOW CONNECTIONS FULL` CLI command, connection details are now displayed at the bottom of the subsequent screen. Information displayed includes maximum allowable connections, number of used connections, number of free connections, and number of rejected connections.

Setting chunk sizes when initializing storagesets

When assigning chunk sizes with the `INITIALIZE RAIDSET CHUNKSIZE=xx` CLI command, ACS now rounds up user-defined chunk sizes to the next number that is evenly divisible by 8 to eliminate the possibility of controller performance issues. Previously, controller performance under some conditions were degraded when the chunk size was not divisible by 8.

Containers with user-defined chunk sizes created prior to this release function as before. This change to the `INITIALIZE RAIDSET CHUNKSIZE=xx` CLI command only impacts those containers created after the ACS V8.8-1 upgrade is implemented on affected controllers.

Current units created with odd numbered cluster sizes still operate normally.

SHOW THIS or OTHER *FULL* CLI command and additional vendor ID information

ACS now displays vendor ID information for the controller after entering a `SHOW THIS CONTROLLER FULL` or `SHOW OTHER CONTROLLER FULL` command from a CLI prompt.

Disk Drive Auto-read-reallocate bit activation

Select disk drives use an auto-read-reallocate (ARRE) function that allows drives to resolve recoverable errors. With this release, all disk drives with a model number beginning with *B* (for example *B00721937*) implement ARRE functionality.

Disk Drive SMART Error Handling

ACS now changes the configuration for the SMART (self-monitoring analysis reporting technology) attribute on disk drives used in HSG60 and HSG80 array controller subsystems. Configuration changes to disk drive SMART attributes now support HP standards. SMART events are now only reported as recovered errors and are reported to the host during normal I/O operations.

ACS Downgrade

With this release, you can downgrade ACS from V8.8-1 to V8.7-1 or V8.6-1 (the base version). No other versions are supported. With this, changes have been made to associated screens. Contact HP support for additional information.

Note: If you are downgrading ACS V8.8-1 and pre-existing patches from V8.6 or V8.7 remain in controller memory, the system downgrades your system to the highest patch level that was previously installed.

Procedural changes when modifying Cache Mirror mode

After entering the CLI command to change the cache operational mode (`MIRRORED_CACHE` or `NOMIRRORED_CACHE`), array controllers now display a report showing units with persistent reservations. Following this screen report, the system requires you to determine which units are attached to the same cluster or host before changing the cache configuration. See the *HP StorageWorks Array Controller and Array Controller Software Command Line Interface Guide* for additional information.

Note: Since Tru64 UNIX host systems automatically assume that persistent reservations are never lost and array controllers automatically restructure cache data whenever its operational mode is changed, additional steps must be taken. First, you must associate any one unit with persistent reservations. Then, you must enter the `SET unit FAKE_PR` command to restore persistent reservations that may have been lost. Lastly, you must execute any type of Tru64 UNIX host operation that results in a read to physical unit associated to restore all persistent reservations. Doing this, causes Tru64 UNIX host systems to re-establish unit persistent reservation structures.

Note: Units associated with clusters require that you individually invoke the `SET unit-number FAKE_PR` command against each unit.

Note: Since other operating systems may not re-register their persistent reservation settings with the array controller based upon a single unit's persistent reservation conflict, you must invoke the `SET unit number FAKE_PR` command if there are units with devices not mounted by Tru64 UNIX (that is, units mounted by another supported operating system).

New display information after entering the `DISPLAY RESOURCES` command through VTDPY

After entering the `DISPLAY RESOURCES` command from the *Virtual Terminal Display (VTDPY)* utility prompt, ACS now reports the number of buffers on a specified port, the total number of buffers available, the maximum number of buffers allowed, and the number of sense buffer structures remaining. Refer to the *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Troubleshooting Guide* for additional details regarding this change.

New display information after entering the `DISPLAY HOST` command through VTDPY

Incremental tallies of SFS buffer warnings are now displayed after you enter the `VTDPY DISPLAY HOST` command. Refer to the *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Troubleshooting Guide* for additional details regarding this change.

New Fault Management Utility commands and switches

[Table 3](#) summarizes new *Fault Management Utility (FMU)* commands associated with this update. These new commands are documented in detail in the *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Troubleshooting Guide*.

Table 3: New FMU Commands and Switches

Item	FMU Command or Switch	Description
1.	<code>SHOW RESERVATIONS ALL</code> <code>SHOW RESERVATIONS <i>unit number</i></code>	Displays reservations that exist on one or more units.

Table 3: New FMU Commands and Switches

Item	FMU Command or Switch	Description
2.	SHOW DEVICE_INFO <i>unit</i> SHOW DEVICE_INFO <i>ALL</i>	Displays specific disk information, such as port number, target number, model ID, firmware version, model serial numbers, device flags, and metadata details.
3.	SHOW DEVICE_ERRORS CLEAR DEVICE_ERRORS	Displays device errors and store a log of events in the controller non-volatile memory (NVMEM).
4.	SHOW LAST ALL	Displays pertinent information relative to a controller crash and can be used by an HP service representative to help identify the cause of a controller crash. This command invokes the SHOW LAST ALL <i>FULL</i> FMU command.

ACS Fixes

Table 4 summarizes fixes made to ACS with this release.

Note: Fixes involving Last Failure Codes are very specific, and they address a specific cause for many controller issues; however, fixes for other conditions may exist for that same LFC code.

Table 4: ACS fixes

Item	Subject	Description
1.	WWID loss on remote copy sets during DRM site failover	The problem involving the loss of the initiator WWID on remote copy set (RCS) units after a site failover to target site, and then to a controller failover has been resolved.
2.	New LFC OE199001 and updates to Repair Code 90	<p>Issues on DRM systems that cause a surviving controller to become inoperative after a <i>Field Replace Utility (FRUTIL)</i> replacement controller has been inserted, resulting in a LFC=01942088, has been resolved. The controller failure associated with this issue was recursive.</p> <p>Repair Code 90 has updated troubleshooting steps to handle the following Recursive Bugcheck error scenarios:</p> <ul style="list-style-type: none"> An internal software structure for a write history log unit has been detected inconsistent on "this controller" (the controller that failed). <p>For this condition, the prior firmware (V8.7 and earlier) would have recursively failed with a trace similar to the following:</p> <p>Controller LFC = 01942088 crash. PDAL recursive crash near PC = C016F144 PARAM(7) = 0x00000A1C</p> <p>The controller would have then halted with LED (hex) 25 in the LED codes.</p> <p>With V8.8-1, "this controller" (the controller that failed) comes up misconfigured so that it can avoid a recursive bug check failure.</p> <ul style="list-style-type: none"> Occasionally, recursive controller inoperability problems propagated to the bottom controller during <i>FRUTIL</i> operations in HP StorageWorks Continuous Access.

Table 4: ACS fixes (Continued)

Item	Subject	Description
	New LFC OE199001 and updates to Repair Code 90 (continued)	Follow these steps to troubleshoot the above Recursive Bugcheck error scenarios: 1. On "the other" controller, SET NOFAILOVER. 2. Issue a SET MULTIBUS_FAILOVER COPY=THIS from "the other" controller that did not fail. Note that there is a unit that is inoperative. Take corrective steps to resolve that unit.
3.	Host inoperability and time-consuming events	Delays have been implemented into ACS during time-consuming events to prevent host inoperability issues.
4.	Host aborts and OpenVMS load	ACS improvements have been made to reduce the number of aborts occurring under conditions of heavy I/O loads.
5.	Handling of SMART errors on a device while RUN CONFIG operations is executing	Issues surrounding SMART errors while the RUN CONFIG command is running have been resolved.
6.	SMART error eject flag	ACS has been fixed to ensure that the SMART error eject flag is treated symmetrical across both controllers after FRUTIL operations.
7.	Management enable flag	ACS has been fixed to ensure that the management enable flag is treated symmetrical across both controllers after FRUTIL operations.
8.	Bad disk drives moving from a failedset to a spareset	An issue involving a defective disk drive being inadvertently moved from the failedset to the spareset has been resolved.
9.	Clone utility and controller memory leaks	The issue involving controller memory resource leaks while the CLONE utility is executing has been resolved.
10.	Controller inoperability during controller replacement (LFC 011C010)	The issue involving controller inoperability on the surviving controller during the installation of a new controller while using FRUTIL and resulting in Last Failure Code (LFC) 011C010 (LED Code 25) is fixed.
11.	Disk drive error handling improvement	ACS has been fixed to substantially reduce issues surrounding controller inoperability problems resulting from the installation of bad disk drives into a subsystem.

Table 4: ACS fixes (Continued)

Item	Subject	Description
12.	Controller inoperability and LFC 64030104	With this ACS version, there is no longer a conflict with the use of the previously unsupported <code>SET HOST/SCSI OpenVMS</code> command. Additionally, Issues surrounding controller inoperability problems which resulted from two different entities executing send and receive diagnostic commands to the controller and resulting in LFC 64030104 has been resolved.
13.	Controller inoperability due to LFC 018F2087	The issue involving controller inoperability problems while using <code>FRUTIL</code> which resulted in LFC 018F2087 has been resolved.
14.	Controller inoperability due to metadata errors with single-member mirror sets and LFC 12000103 on both controllers	An issue involving a controller inoperability event, as a result of an unrecoverable read on container metadata (medium error) and the mirror unit, is a single member mirror. The controller failure is recursive, with an LFC 12000103 reason code. A new and unique reason code with a new repair action has been created. The recursive failure has been eliminated, and now, after the controller restarts, access to the rest of the storage occurs. The Repair Code directs activities necessary to recover the unit impacted by the device metadata read issue. <hr/> Note: If a mirrorset member is added to a current single member mirrorset, the controller completely reads the metadata to validate that the mirrorset is without error. If the controller is under a heavy I/O load (near 0% idle) while the controller validates mirrorset metadata, it can take up to 4 or 5 minutes (on 146 GB drives) to read the metadata before adding the new member to the single member mirrorset. If the mirrorset member is smaller, the amount of time it takes to validate mirrorset metadata is reduced proportionally. If no load exists on the controller, the metadata check completes within 2 to five seconds. <hr/>
15.	Controller ejecting devices after bus device resets	ACS now ejects any device (if a member of the redundant storageset) that is responsible for excessive controller-initiated SCSI bus resets.

Table 4: ACS fixes (Continued)

Item	Subject	Description
16.	Adding unit above non-partitioned R5 set and receiving Error 1170: Partitions found on container, unit not created.	This issue has been resolved for most cases. If there is an error noted when this is attempted, refer to the <code>REINITIALIZE</code> command in the <i>HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Command Line Interface Reference Guide</i> for help.
17.	Using the <code>RUN CONFIG</code> command while bad disk drives exist and LFC 83030100	The <code>RUN CONFIG</code> command has been improved and now skips bad disk drives after the command is submitted and completes its routine. Previously, the controller would fail with LFC 83030100. The system reports the following diagnostic error information: DEVICE AT P1:T4:L0 failed initialization, Skipping Device
18.	Controller failure and LFC 44650100	With previous ACS versions, controller restarts that resulted in the issuance of LFC 44650100 occurred if the controller encountered certain workloads (for example, large writes outstanding to the controller). This issue is resolved.
19.	Device error handling	ACS has been improved to better handle device errors and inconsistent drive behavior. ACS more readily ejects drives under failure conditions to the failedset if the container is redundant.
20.	Spontaneous controller restarts on snapshot	Controller restarts attributed to Intel i960 processor, PCI Data or Address Line (PDAL), and Cache Data and Address Line (CDAL) events occurred if heavy I/O load to source units of a snapshot existed. This issue is resolved with this release.
21.	Intermittent LUN failures	Under some conditions, LUNs failed to respond to SCSI inquiries. This issue is resolved with this release.

Table 4: ACS fixes (Continued)

Item	Subject	Description
22.	Controller port TACHYON chip malfunction	With earlier versions of ACS, controller port TACHYON chip lock-ups occurred. Issuing the <code>DISPLAY HOST Virtual Terminal Display (VTDPY)</code> command, in some cases, reset the port. With this release, ACS employs an automatic port reset.
23.	Excessive abort messages logged by the host	Under excessively high I/O rates, which included large transfers, host systems occasionally aborted previous work queued to the controller due to considerable controller activity. This issue was further complicated by the use of partitioned containers and path switches. With this release, host systems initiate a fewer number of aborted I/Os.
24.	Fibre Channel (FC) switch goes port INSYNC state to HSG	Prior to this release, resource leaks occurred if a controller processed PLOGI frames against the rejected host list while the connection table was locked. The controller would report that all port conditions were <code>Good</code> . The FC switches would report as being in the <code>INSYNC</code> state for connections to one or more controller ports. Consequently, this condition could not be cleared through <code>VTDPY</code> . This issue is resolved with this release.

Solution Software Updates

Several significant installation changes have been made in Solution Software V8.8-1 for Sun Solaris. The most significant changes are a friendlier and more logical installation process and moving `/opt/steam/bin/config.sh` Option 20 to `/opt/HPfcraid/bin/config.sh`. Following are the significant logistical items that result from this change:

- Qualified Solution Software V8.8-1 with ACS V8.8-1 and the components defined in these Release Notes.
- When you uncompress and un-tar the bundle, the top level of the directory contains the `install_stgwns` script. This script is run on first-time installations as well as upgrades on all valid versions of HBA drivers and HSG80 Solution Software. Answer “yes” to all queries to remove and replace all currently installed drivers.
- The install option “Select mode automatic or manual [A,m] :” has been removed. The option has been replaced with appropriate queries to install available drivers but does not allow the option to not install related dependent packages.
- The `/opt/HPfcraid` directory is now used for all new installed adapter configuration options (Option 20).

Note: This does not replace an installed `/opt/CPQhsv` or `/opt/CPQfcraid` directory.

- The `config.sh` Option 20 script has been moved to the `/opt/HPfcraid/bin` directory. This script can be used for configuring installed HBAs and adding new arrays, HBAs & HBA ports after the initial install configuration.
- To remove the Platform Kit and Secure Path packages, search for all installed packages using: `pkginfo | egrep "CPQ|QLA|fca|HP"` and `pkgrm` all found packages.
- Added support for Secure Path V3.0D software.
- The Sun Solaris required patch list has been updated. See “[Required Patches](#)” on page 32, for more information.

Documentation Updates

The following documentation changes were made in order to consolidate and reduce the number of documents associated with V8.8-1 Solution Software:

- The section "FC Switch Updates" was removed along with the Fibre Channel Switch Support table. Switch support information is available in the *HP SAN Design Reference Guide* at <http://h18006.www1.hp.com/storage/saninfrastructure.html>.
- New document *Enterprise and Modular Storage RAID Array Fibre Channel Arbitrated Loop Configurations Application Note* consolidates prior release, host-specific FC-AL application notes into a single, multivendor document for FC-AL configurations. This document supersedes the following application note:
 - *Enterprise and Modular Storage RAID Array FC-AL Configurations for Sun Solaris Application Note*, Part Number: EK-FCALH-AA. B01

The following changes were made to the general content of these Release Notes since they were last published:

- A new section, "[Multiple Storage System Types](#)" on page 9, was added to address basic configuration rules used in mixing different HP StorageWorks products in the same SAN.
- A new section, "[ACS Feature Support](#)" on page 37, was added to assist customers who wish to extend the interoperability of their SAN.
- The section "[Layered Software Applications](#)" on page 35, was updated.
- The section "[Disk Device Support](#)" on page 31, was updated.
- The section "System Components", page 31, was updated.

Hardware and Software Support

This section lists the hardware, devices, and operating system versions that are compatible with this Fibre Channel Solution Software Kit.

Array Hardware Support

ACS V8.8-1 is the firmware component of the HP StorageWorks HSG60 and HSG80 array controllers. When configured in one of these controllers, ACS supports the following storage arrays: MA8000, EMA12000, EMA16000, MA6000, RA8000, ESA12000 storage systems.

Additional information regarding hardware specifications can be found at <http://h18006.www1.hp.com/products/storageworks/acs/related.html>.

Disk Device Support

To retrieve the latest list of devices supported with HSG60 and HSG80 array controllers:

1. Go to the following link:
<http://h18006.www1.hp.com/products/storageworks/softwaredrivers/acs/>
2. Select the **manuals (guides, supplements, addendum, etc)** link under self-help resources.
3. Select the **HSG60, HSG80, HSJ80, HSZ80 Supported Disk Drive Matrix** link.

Switch Support

This Fibre Channel Solution Kit supports the Fibre Channel switches and firmware versions listed in the *HP StorageWorks SAN Design Reference Guide* and *SAN Product Support Matrix* at <http://h18006.www1.hp.com/storage/saninfrastructure.html>.

System Components

This Fibre Channel Solution Software Kit supports the system components and operating system versions listed in [Table 6](#).

Table 6: Minimum System Requirements

Component	Requirement
Controller Compatibility	StorageWorks HSG80 Array Controller, ACS V8.8-1 (or a subsequently patched version of ACS V8.8-1)
Platform	Sun 4u Architecture only.
Operating System	Sun Solaris 32-bit Mode: V2.6, V2.7 (Solaris 7), V2.8 (Solaris 8), V2.9 (Solaris 9) Sun Solaris 64-bit Mode: V2.7, V2.8, V2.9 Sun Clusters V2.2 (2.6, 2.7, 2.8), V3.1 (Solaris 9, FCA2257P only) Veritas Clusters V3.5
Topology	Fibre Channel Switched (FC-SW) Fibre Channel Arbitrated Loop (FC-AL)

Table 6: Minimum System Requirements (Continued)

SCSI Protocol	SCSI-2 SCSI-3
Failover Mode	Transparent Multi-Bus (requires Secure Path software)
Host Mode	SUN
Disk Space	150 MB for installation
Adapter Compatibility	HP StorageWorks 32-bit, 1 Gbps Sbus FC HBA (380575-001), HBA driver Version 2.6.13, Firmware Version 13.3.7
	HP StorageWorks 64-bit, 1 Gbps Sbus FC HBA SWSA4-SC (123503-001), HBA driver Version 2.6.13, Firmware Version 13.3.7
	HP StorageWorks 32-bit, 1 Gbps PCI FC HBA SWSA4-PC (380576-001), HBA driver Version 2.6.13, Firmware Version 3.0.3 (visual inspection only, not field upgradeable)
	HP StorageWorks 64-bit, 1 Gbps cPCI FC HBA 3R-A3512-AA (254457-B21), HBA driver Version 4.13.01, Firmware Version 2.2.6, F-Code Version 1.18.5, 2.00.05 (FC-SW only) for Solaris 8, 9 only
	HP StorageWorks 64-bit, 2 Gbps PCI FC HBA 3R-A3513-AA (254456-B21), HBA driver Version 4.13.01, Firmware Version 3.2.15, F-Code Version 1.18.5, 2.00.05 (FC-SW only)
	HP StorageWorks 64-bit, 1 Gbps Sbus FC HBA 3R-A3514-AA (254458-B21), HBA driver Version 4.13.01, Firmware Version 2.2.6, F-Code Version 1.18.3, 2.00.05 (FC-SW only)

Required Patches

This release of this Solution Software Kit was qualified with the following Sun Solaris patches installed:

Note: Do not neglect the required patches listed in [Table 7](#). Your system will not function properly without them.

Table 7: Sun Solaris Patch Requirements

Host Feature	Requirement
Required Patches	<p>Solaris 2.6: 112542-01, 106125-16, 105181-35, 106226-03, 105356-23, 105210-51, 107665-01, 105568-26</p> <p>Solaris 2.6 Ultra Enterprise 10000 system: 106284-07, 109334-03, 106381-06 (These patches are required for this system in addition to those listed for Solaris 2.6.)</p> <p>Solaris 7: 107834-04, 107544-03, 106541-30, 106950-24, 106327-20</p> <p>Solaris 7 Ultra Enterprise 10000 system: 107450-04 (This patch is required for this system in addition to those listed for Solaris 7.)</p> <p>Solaris 8: 116602-01, 115827-01, 113648-03, 111317-05, 111023-03, 110386-03, 108989-02, 112396-02, 110912-04, 111310-01, 111111-03, 108987-13, 108528-27, 109793-23, 108993-31, 109147-27, 108434-13, 108435-13</p> <p>Solaris 8 Ultra Enterprise 10000 system: 110389-05, 110794-05, 111049-03 (These patches are required for this system in addition to those listed for Solaris 8.)</p> <p>Solaris 8 Sun Fire 15000 system: 110830-02, 110831-02, 110837-05, 110836-05, 110826-09, 110838-06, 111335-18 (These patches are required for this system in addition to those listed for Solaris 8.)</p>
	<p>Solaris 9: 114129-01, 114127-02, 114369-01, 113072-07, 114132-01, 114131-01, 113049-01, 112233-11, 112834-03, 113277-17, 114128-01, 113981-02, 114389-02, 113454-14, 113073-05, 112966-03, 113457-05, 115018-01, 115020-01, 114721-04, 115022-02, 115024-01, 115026-01, 113993-06, 113492-04, 115030-01</p>

StorageWorks Command Console (SWCC)

SWCC V2.5 is included in this release and is used to identify the SWCC suite of components.

SWCC provides a graphical user interface that can be used to configure and monitor your storage system. Use of SWCC is highly recommended, but not required. The SWCC Agent is installed as part of the Solution Software Kit.

For more information on SWCC installation, see the HP StorageWorks HSG80 ACS Solution Software Installation and Configuration Guide. For more information on SWCC Client operation, see the *Command Console Version 2.5 User Guide* and the *Command Console Version 2.5 Release Notes*.

SWCC Scalability

- The SWCC Client can monitor up to 128 host systems, each with up to 32 storage systems, for a maximum of 4096 concurrent storage connections and a total of 2.65 PB of storage.
- One Agent can support up to 32 Clients.

Multiple Agents

This Solution Software Kit contains an SWCC Agent that supports controller locking during CLI command execution, which allows support for multiple Agents. This locking feature is required in order to use the Management Appliance in addition to the host-based SWCC Agent. However, it is not recommended or required to use multiple Agents for any other purpose.

Note: SWCC Agent V2.3.2, Build 79 or later supports the locking feature. This release of Solution Software exceeds this requirement.

Multiple Management Sessions

Though multiple Clients can be used to monitor the storage system, HP recommends that only one instance of storage system management be active at a time. The Client allows for multiple management sessions, but there are no ownership rights given to any particular session. Without a highly coordinated effort, multiple management sessions can undermine the integrity of system maintenance. This same principle applies to multiple management sessions initiated through the Management Appliance as well.

Secure Path Software

Secure Path is a high availability, multi-bus software application that supports FC-SW connectivity. This Fibre Channel Solution Software Kit supports Secure Path software V3.0D.

Note: For more information on Secure Path software, see the product documentation that comes with the product, or visit the HP web site:
<http://h18006.www1.hp.com/products/sanworks/secure-path/index.html>

Layered Software Applications

Compatibility with HP StorageWorks layered software applications is defined in [Table 9](#).

Table 9: Layered Application Compatibility

Application	Application version	Supported ACS versions and variants
HP SANworks Storage Resource Manager (SRM)	V4.0B	V8.8-1F
HP StorageWorks Command Scriptor	V1.0B	V8.8-1F/S/P
HP OpenView Management Appliance	V1.0C	V8.8-1F/S/P
HP StorageWorks Enterprise Volume Manager (EVM)	V2.0D	V8.8-1F/S/P
HP OpenView Storage Virtual Replicator	V3.0A	V8.8-1F
HP SANworks Network View	V2.0B	V8.8-1F/G/S/P
HP SANworks Storage Allocation Reporter	V1.0D	V8.8-1F

In cases where ACS functional builds other than V8.8-1F are required, ensure that all necessary components for those configurations are at the proper level prior to upgrading your ACS code.

If you use EVM with ACS V8.8-1F, you can use scripting with Snapclones. If you want to create Snapshots with EVM, you must use ACS V8.8-1S or V8.8-1P.

More information and specific product documentation on storage management software is available at the HP StorageWorks website:

<http://h18006.www1.hp.com/storage/software.html>

ACS Feature Support

The following sections provide details for specific ACS features.

SCSI-2 to SCSI-3 Migration

In order to extend interoperability within the heterogeneous SAN, HP highly recommends that customers begin migrating from SCSI-2 to SCSI-3 protocols. Moving to SCSI-3 allows greater diversity in the operating systems (OS) and storage products (including EVA) that comprise a SAN.

All migrations from SCSI-2 to SCSI-3 should be planned during scheduled downtime. SCSI migrations require a controller restart and most likely a server restart. Data contained on CCL units needs to be moved to new units once SCSI migration is complete.



Caution: Before attempting a SCSI-2 to SCSI-3 migration, it is extremely important that all data be backed up and that units be available for remapping CCL data. In addition, ensure that all redundant storagesets are in normal (non-reduced) mode.

When migrating from SCSI-2 to SCSI-3, the controller checks for controller unit D0 and does not change modes until D0 (at all presented offsets) is deleted. One or more LUNs are lost after the mode change. If you are planning to move from SCSI-2 to SCSI-3, back up your data first. The data in LUN 0 (and any other offsets that map to LUN 0) that was used in SCSI-2 requires that the data be moved to a different LUN. It may be necessary to retrieve this data from a backup.

Note: If multi-bus failover configurations or server clustering are employed in the environment, there may be additional considerations regarding CCL usage during SCSI migration procedures. Refer to your multi-bus failover or server clustering documentation prior to implementation. In addition, there may be OS-based limitations on SCSI-3 usage to consider, particularly in down-level versions of your OS. Review OS documentation prior to migration.

For more information, see the “What is the Command Console LUN?” and “Assigning Unit Numbers Depending on SCSI_VERSION” sections of Chapter 1 in the HP StorageWorks HSG80 ACS Solution Software Installation and Configuration Guide.

Host Operating System Notes

The following section lists host-specific operating notes.

Host Operating System Support of Multi-Bus Failover

Multi-bus failover is supported on the Sun Solaris operating system through the use of Secure Path software. See “[Secure Path Software](#)” on page 35, for version compatibility and restrictions.

Solution Software Uninstall in Multi-Bus Configurations

When uninstalling the Solution Software Kit (CPQfcraid) from systems configured with 3R-A351x-AA Series HBAs and Secure Path, HP recommends that you also uninstall all 3R-A351x-AA Series HBA drivers in use, which will allow Secure Path to correctly rediscover units.

SCSI-3 Mode

V8.8-1 Solution Software supports connections using SCSI-3 mode. A SCSI generic driver is not supplied, so the CCL LUNs are ignored. The Solaris server loses the ability to use two LUNs (D0 and D100). Any Agent connections to the storage system must be done using an active LUN, not the CCL. To avoid this, use SCSI-2 mode with the CCL disabled.

Host Function

The default operating system value for a connection is WINNT. For proper operation, please change this to SUN by using the following CLI command (example is given for the connection named !NEWCON01):

```
HSG80> SET !NEWCON01 OPERATING_SYSTEM=SUN
```

Dynamic Reconfiguration

Dynamic Reconfiguration is supported by the included HBA drivers.

A Storage System Name Cannot Use a Pipe Character

When adding a storage system, do not use the pipe character (|) in the name.

Installation Script May Not Correctly Modify the */etc/nsswitch.conf* File In NIS Configurations

If you are using NIS, make sure that your services entry in */etc/nsswitch.conf* looks like this:

```
services: files nis
```

This will ensure the edits made to the */etc/services* file will be used.

Maximum Supported Storageset Size

With this release, Solaris can support storagesets up to 1.024 TB with the following limitations:

- You cannot enter the LUN logical geometry manually; it must be sensed by format automatically. LUNs configured manually are still limited to 256 GB. You must limit the number of sectors/track to 255 and the number of heads to 128 when the LUN is initialized. In other words, you will have to use the CLI to create and initialize LUNS to ensure that these limits are observed. Type the command:

```
initialize <container> heads = 128 sectors_per_track = 255
```

- If you are using Solaris 2.6, you must have patch # 105568-26 loaded, or format will dump core.

Per-Instance Device Configuration

By default, all instances of a driver for a particular adapter type are configured in the same mode (FC-SW or FC-AL) depending on the mode selected during driver installation.

If you must configure different adapter instances in different modes, you may select Option 20 of *config.sh* to change the mode for a specific adapter instance.

Large SAN Considerations

If you are having problems seeing LUNs, typically on a large SAN, increase the value of *scsi_probe_delay*. A value of 3000ms for a UE10000 is recommended. A greater number of storage systems may require a larger number for *scsi_probe_delay*.

To change `scsi_probe_delay` values, the following configuration files (depending on bus architecture), found in the `/kernel/drv` directory, should be edited:

```
32-bit Sbus: fca.conf
64-bit Sbus: fcaw.conf
32-bit PCI Bus: fca-pci.conf
```

Messages on Console After Driver Initializes

You may see messages similar to the following on the console after the driver initializes:

```
/kernel/drv/fca symbol ddi_model_convert_from multiply defined
NOTICE: fca_transparent: utsname.release: 5.6
```

These messages can be safely ignored. They are removed in a future release.

Required Patches

Do not omit the required patches (see “[System Components](#)” on page 31, of these Release Notes). These patches are required for proper operation of your RAID Array.

The installation program (`install_stgwks`) checks that you have the required patches loaded and notifies you if any are missing. If any patches are missing, the installation lists all required patches, not just the missing ones.

Type the following command to list the patches already installed on your system:

```
# showrev -p
```

Minimum System Memory Requirements

Because of the increased functionality and performance of the 2.5.9.x drivers, the Sun server memory requirements have increased. A minimum of 256 MB of memory is required in the Sun server before loading the FC adapter drivers.

Maximum Supported HBAs per System Board

For Sun Enterprise machines (including E3000, E3500, E4500), the maximum number of adapters that may be installed in any sbus I/O tray is two. The maximum number of I/O trays is limited only by the system expandability.

Number of Supported LUNs

This release of *HP* Solution Software adds support for 16 LUNs per port/Target. This should be adequate for most installations.

However, the array controller and Solaris can support up to 64 LUNs per port/Target. If your environment requires more than 16 LUNs/Target, you may perform the following work-around, keeping the following items in mind:

- Make sure that all the required patches are loaded.
 - You may need to adjust the `sd_max_throttle` setting in `/etc/system`.
 - SWCC has not been tested, and is not supported with more than 32 LUNs.
 - See the *driver.conf*(4) and *sd*(7D) man pages for more information.
1. Run `config.sh` and choose Option **20**; Add/change adapters.
 2. Choose Option **4**; Modify an adapter.
 3. Select the adapter that you want to modify.
 4. Follow the instructions to modify the number of LUNs/Target.

Note: Do not enter more than 64.

5. Create your LUNs on the array controller. If you are working in transparent mode, units 0–99 appear on port 1 (`al_pa=72`, `target=64`), and units 100–199 appear on port 2 (`al_pa=71`, `target=65`). If you are working in multi-bus mode, units 0–199 are visible on both ports.
6. Shut down and do a reconfigure boot (`boot -r`), and your new units should be ready for formatting.

`sd_max_throttle` Setting in `/etc/system`

Solaris defaults to a queue depth of 256 tagged commands per LUN, but it only recognizes LUN 0 on each target. The HP RAID Manager software adds support for 16 LUNs per target, but Solaris still allows 256 queued commands per LUN. With 32 LUNs mounted, you can have over 8000 outstanding queued requests, but the controller only supports 256 queued commands per port.

The solution is to restrict the maximum queue depth by setting `sd_max_throttle` in the `/etc/system` file. The Solution Software has already throttled the queue depth back to 32 during the installation. This works fine for most environments. If

you are doing heavy I/O to 16 or more LUNs, you need to set `sd_max_throttle` even lower. Edit your `/etc/system` file, and change the `sd_max_throttle` entry in the CPQfcraid section. You must shutdown and reboot for the changes to take effect.

Set `sd_max_throttle` so that the number of active LUNs on the port times `sd_max_throttle` is less than or equal to 256 (the maximum number of queued requests for the port). For example, 16 busy LUNs on a port requires a `sd_max_throttle` setting of 16 ($256/16 = 16$).

For more information, see the *system* (4) and *sd* (7D) man pages.

Manually Specifying Logical Geometry for a Large Storage Set

There are two ways to configure a LUN's logical geometry:

- Automatic Mode: This is the preferred method. Storage sets up to 1.024 TB can be configured this way.
- Manual Mode: When using manual mode, maximum values are smaller, which reduces maximum LUN size to 256 GB. If you prefer to use manual mode, it is documented below.

The Solaris `format` command is used to label and partition a storage set before a file system can be created on it. For large storage sets with a high number of large disks, the controller may specify a geometry that exceeds the parameters supported by the `format` command. The maximum values supported by Solaris (when manually configuring geometry) are:

- 32,767 cylinders (including 2 alternate cylinders)
- 64 heads
- 256 sectors per track

The symptoms of exceeding these maximums will vary.

Exceeding 64 heads causes **newfs** to abort with the following error message:

```
There is no block size that can support this disk
```

Exceeding 32767 cylinders causes `format` to report an incorrect size (much higher or lower than the actual size of the storage set).

To properly configure a storageset where the logical geometry exceeds these values, follow these steps:

1. Get the size of the storageset by performing a `SHOW` on the unit from the CLI on the array controller (e.g. `SHOW D100`). This results in a display with the following format:

```

LUN                                     Uses
-----
D100                                   S0

LUN ID:6000-1FE1-0000-13E0-0009-8090-0624-0147

NOIDENTIFIER
Switches:

RUN          NOWRITE_PROTECT READ_CACHE
READAHEAD_CACHE      WRITEBACK_CACHE
MAXIMUM_CACHED_TRANSFER_SIZE = 2048
Access: ALL

State: ONLINE to this controller
Not reserved
Size: 248768478 blocks
Geometry (C/H/S): ( 73601 / 20 / 169 )

```

2. Record your results. Your actual numbers vary depending on the exact size of your storageset. The values given represent the number of data cylinders (cyl), the number of heads (hd), and the number of sectors per track (sec).

Note: In the above example, the Solaris `format` command reports the cylinder count (cyl + alt) as 8065, giving a much smaller total block count for the above storageset.

3. Make your calculations. The goal of the calculation process is to ensure that all parameters end up in the valid ranges specified earlier in this section. Throughout the calculation, the total number of blocks should remain constant or as close to the original value without exceeding it. This is achieved by dividing one value (e.g. cylinders) by the same amount as one of the other values (e.g. heads) is multiplied. In this example, we divide the number of cylinders and multiply the number of heads by the same value: 3. This results in the following values:
 - 24533 cylinders
 - 60 heads

- 169 sectors per track
- 4. At this point, allocate the alternate cylinders (2) from the total number of cylinders to get the following values:
 - 24531 data cylinders
 - 2 alternate cylinders
 - 60 heads
 - 169 sectors per track

Write down the above data and proceed with the next step.

5. Using the `format` utility, reconfigure your storage set's logical geometry.
 - From the **main** menu, select the storage set.
 - From the **type** menu, select **other**.
 - Enter the new number of data cylinders, heads, and sectors when prompted. Press **return**, to take the default, for **all** other questions.
 - Use the `partition` command to create the desired partition table layout.
 - Use the `label` command to write the new geometry to the storage set.

Upon completing the above process, you are now able to use the `newfs` command to create file systems on the partitions you have created.

Using the “fsck” Utility on Large Storage Sets

When attempting to `fsck` a large storage set, you may get the following error:

```
Cannot alloc 115667202 bytes for acinop
```

The actual number is irrelevant. This error means that your system does not have enough virtual memory to `fsck` a large device. This is a known problem with `fsck`.

The solution is to add swap space with the `swap -a` command. HP testing has shown that up to 500 MB of free memory is required to run `fsck` on a 120 GB storage set.

Booting Under Solaris

Booting under Solaris using the array controller has not been tested and is not supported.

Command Console LUN

The array controller can provide a dedicated communications LUN called the Command Console LUN (CCL). The CCL can cause some issues under Solaris. During booting, you receive a *corrupt label - bad magic number* error because Solaris “sees” the CCL as a 320MB read-only disk. This message is just a warning and can be ignored. You may disable the CCL if desired.

Setting maxcontig and rotdelay for File Systems

The overall performance of your configuration can be affected by your choice of `maxcontig` and `rotdelay` values. The `maxcontig` value specifies the maximum number of contiguous blocks that are written before inserting a rotational delay. The `rotdelay` value specifies the time (in milliseconds) of the rotational delay.

HP recommends that for optimal performance the `rotdelay` always be set to 0.

The `maxcontig` value depends somewhat on the number of units that are active in your controller configuration. In HP testing, values of 128 and 256 blocks have worked very well. Your exact value depends on the number of storagesets in use. If your system is reporting excessive numbers of warnings (`ddi_iopb_alloc failed` or `fca_dma_zalloc failed`) your value may be too high.

Both the `maxcontig` and `rotdelay` values can be set at the time of file system creation with `newfs` flags, or they can be modified at a later time using `tunefs`. When using `tunefs`, the file system must be unmounted. See the `newfs(1M)` and `tunefs(1M)` man pages for further details.

Driver Messages

The driver initialization message may reference Solaris Versions 2.5 and 2.6. This message is incorrect and should be ignored. See “[System Components](#)” on page 31, for supported O/S levels.

Note: Virtual Disk Wizard in multi-bus failover mode is not supported with the Secure Path driver.

ACS Anomalies

If you issue the `INITIALIZE SAVE_CONFIGURATION CLI` command on a JBOD disk to save the controller configuration while the unit is not above the container, the command appears to work, but the save operation does not occur. You must place the unit above the JBOD, and then issue the `INITIALIZE SAVE_CONFIGURATION` to accomplish this task.